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ROCKS and MINERALS

Vol. 5. No. 3. SEPTEMBER, 1930 Whole No. 17

Courtesy Union Miniere du Haut Katanga.

The Open-Pit Copper Mines at Ruashi, Katanga District, Belgian Congo, Africa. The copper deposits of the Katanga District are among the richest known. Beautiful specimens of precious malachite come from these mines.

SPECIAL ARTICLES

THE MAGAZINE FOR COLLECTORS

2000 Copies Printed This Issue.

THE BULLETIN BOARD

ROCKS AND MINERALS TO CONTINUE QUARTERLY

The drive for a monthly has brought in so few responses that we think it best to drop the matter entirely and cancel all pledges sent in. Out of our large number of subscribers only 49 co-operated with us; 30 sent in 117 pledges while 19 sent in or were responsible for 38 new subscriptions.

We have no comments to make. We thought that our proposal to issue the magazine monthly—without increasing the price at all—would meet with the hearty approval of all our subscribers and that they would give us their full support.

In this issue we are printing for the last time the list of new members enrolled in the Rocks and Minerals Association; and at the end of the year we shall disband the Association as we find the interest in this to be waning.

Alex. J. Laurenson, President of the State Microscopical Society of Illinois, and a member of the Rocks and Minerals Association, is keenly interested in forming a mineralogical club in his city (Chicago). Those of our members living in or near Chicago, and who likewise are interested in such a club, are requested to write, phone or call on Mr. Laurenson for further information. His address is 6342 Throop St., Chicago. Phone Wentworth 3822.

A cordial invitation is extended by Mr. Laurenson to all members of the Rocks and Minerals Association to attend one of the meetings of the State Microscopical Society of Illinois. This Society, Incorporated in 1869, is one of the oldest Scientific Societies in the country.

One of the purposes of the State Microscopical Society of Illinois is to stimulate and arouse an interest in the use and importance of the microscope in the amateur. At their last meeting there was an attendance of between 500-600.

We are indebted to C. L. Brock, Director of the Houston Museum of Natural History, Houston, Texas, for the very interesting article "My Mineral Discoveries since 1879" contributed by Wm. Niven, which we have great pleasure in printing in this issue. We are very sure this article will be enjoyed by our readers and subscribers and especially by those residing in the cities or localities mentioned in the article as contributing choice and beautiful or rare minerals.

Mr. Niven at one time was an active dealer in minerals—his office being in New York City—and he is well remembered by many of our older collectors. In mentioning him to one of our subscribers we received this: "As to Bill Niven, it is hard for me to believe he is still alive. I consider him one of the greatest field collectors ever. I have heard him talk for hours about his exploits, and he exploited nearly all of Mexico, and I do not remember a more interesting story teller than he was. Besides English, he spoke Spanish, Portuguese, and some of the dialects native to the people of Mexico."

We trust Mr. Niven can favor us with another interesting article for a future issue.

WANTED: Correspondents in all parts of the world who will be kind enough to send us notes and news items on minerals, etc., that they think may be interesting to the subscribers of ROCKS and MINERALS. Such as are available we shall be very glad to print in the magazine.

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ROCKS AND MINERALS

The Magazine for Collectors

Published Quarterly

Peter Zodac
Editor and Publisher

The Official Journal of The Rocks and Minerals Association

Vol. 5, No. 3. SEPTEMBER, 1930 Whole No. 17

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ROCKS AND MINERALS PEEKSKILL, N. Y., U. S. A.

Exchange Department

Listings—50c per year—one line only.

A—Advanced Collector
M—Medium Collector
B—Beginner
C—Correspondence only

The following Rules must be observed:

1—Minerals for exchange must be of good quality.

2—Label them plainly—in ink—name of mineral and place where found.

3—Have a list made of what you can supply—describing each mineral.

4—Send a copy of your list to the collector with whom you wish to exchange and wait for a reply containing his list.

5—Pick the minerals off his list you want and so write him. In this way some arrangement can be made that will be pleasing to both.

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MINERAL LOCALITIES INFORMATION DEPARTMENT

Members desiring information regarding minerals or mineral localities in the following states may obtain it by writing to the Collectors listed and enclosing a self-addressed stamped envelope.

THE NORTHWEST—Washington, Idaho, Montana, Oregon and parts of British Columbia	Charles O. Fernquist, Curator of Mineralogy, Public Museum, 2316 First Avenue, Spokane, Wash.
Oregon, Southern Idaho, Northern Nevada	Dr. Henry C. Dake, 793½ Thurman Street, Portland, Ore.
The Oregon Coast, South and Western Oregon, Northern California, Southern Washington	John M. Tracy, 601 Orange Street, Portland, Ore.
Petrological Information in Central Eastern Iowa	Prof. Wm. J. H. Knappe, Curator, Wartburg College Museum, Clinton, Iowa.

My Mineral Discoveries Since 1879

—— By ——

William Niven, Director.

Houston Museum of Natural History, Houston, Texas.

In 1879, I made my first trip as a mining prospector from New York City to Leadville, Colo., with the rush of gold seekers to that famous Eldorado and a year later I went to Santa Fe, New Mexico, meeting Governor Lew Wallace, the author of "The Fair God" and "Ben Hur." Two years were spent in New Mexico, resulting in the discovery of rich copper deposits in the Gallinas Mountains and in 1883, I was appointed Mining Commissioner of Lincoln County to the Tertio-Millennial Exposition at Santa Fe, where I had a rare and beautiful display of crystallized Azurite and Malachite specimens (many of the Malachites being in the form of unique stalactites), together with a rich collection of free gold and native silver ores from the White Oaks Mining District.

In 1884, I had my first glimpse of Houston, on the journey to New Orleans as Assistant Commissioner of Arizona to the World's Fair, with a carload of specimens which I had collected in that Territory for over a year at my own expense, consisting of rich gold, silver and copper ores, chiefly from Tombstone and the Copper Queen Mine, Bisbee, and a ton of the newly discovered Jasperized Wood from the Fossilized Forest of Arizona.

In 1885, at the close of the Exposition in New Orleans, the entire exhibit from Arizona, over twenty tons, was shipped by freight boat to New York City, where for a number of years I carried on a regular mineral business and my explorations in and around New York City kept me constantly and plentifully supplied with mineral specimens, many very important discoveries of fine species and varieties were made. One of these was a huge garnet crystal, said to be the largest ever found, weighing nine-pounds-nine ounces, and six inches in diameter. It was unearthed by a laborer making an excavation on 35th Street near 3rd Avenue, eight feet below the surface and flung up on the dump, when I happened to be passing along. After a careful cleaning it was found to be a perfect dodecahedron crystal of an Almandite Garnet and was placed in the window of my mineral store at 246 West 23rd Street, for sale, with the price marked $100.00. Next day it was bought by a well-known gem expert of Tiffany & Company and is now on display in a loan exhibition of the Mineral Department, American Museum of Natural History, New York City.

One of the best localities in those years was along Washington Avenue, from 165th Street to 181st Street, where I prospected from 1886 to 1889, finding thousands of crystals, including Garnets, Tourmalines, Topazes, etc.—one Xenotime crystal, the phosphate of yttrium, honey color, translucent—was said by Professor S. L. Penfield to be the second finest crystal of that rare mineral he had ever seen.

At 181st Street and Washington Avenue, with the official written permission from the Chief of the Board of Public Works, New York City, I hired a number of laborers for several months and with drills and dynamite, blasted many tons of rock, securing hundreds of fine crystals of different minerals—the largest being a black Tourmaline crystal ten inches long, and four inches in diameter, on a quartz matrix, which weighed sixty pounds and which was purchased by the American Museum of Natural History. Next morning the *New York Herald* had a picture of it with the heading: "Largest Sale of Real Estate ever made on Manhattan Island. William Niven sells to the American Museum, a specimen of rock from 181st Street, with a Tourmaline crystal, weighing sixty pounds, for $250.00; said to be the largest crystal of that mineral in the world."

One of my mineral prospecting trips was to Hot Springs, Arkansas, and at an excavation on the principal street for water, just in front of where the Arlington Hotel is today, the workmen had struck a large deposit of beautiful quartz crystals. Purchasing the right from the contractor to do some blasting for a day, I exposed a pocket of fine specimens from which I obtained one group of transparent quartz crystals, with prisms several inches high and three to four inches in diameter, perfectly terminated, which was bought by the American Museum of Natural History for $350.00 and believed to be the finest largest transparent perfect crystals of this mineral in existence.

But of all the mineral discoveries which I had the good fortune to make in my life time—the most important, rare and valuable, were the new mineral species, Yttrialite, Thorogummite, Fergusonite and Nivenite, which I found in Llano County, Texas, in 1889—about twenty miles from Burnet on the west bank of the Colorado River, where the surrounding region for many miles is Archean, with occasional cappings of limestone and granite, in various shades of color and texture, is the common country rock. A coarse-textured, deep-red granite is the most abundant and through it numerous and extensive quartz veins extend to the surface. Only in these veins have the ores of yttria been found and only in the wider swellings of these veins or where they have assumed the character of bold uplifts have masses of large size been found.

Here is to be seen a mound-like elevation 100x150 feet in area, projecting boldly from the surrounding granite and 27 feet in elevation above the river terrace. It consists of huge blocks and masses of quartz and red feldspar, all tightly pressed together. The mound is nearly circular in form and the contact with the country granite is sharply defined. It is plainly seen to be the widening of a vein that can be traced in a southwesterly direction for some distance and one of a series to be seen at several locations in the near neighborhood. The quartz masses are from five to twenty feet thick, with the interstices filled completely by a highly crystalline red feldspar. Between these irregular masses are found at times, thin seams of a black iron-mica and with this mica, and in the adjacent feldspar, are found the various ores of the rare earths which I will now describe. From all sides of this mound I entered with trenches, and one or more of the yttria minerals were found at each opening.

On the river side, the mound is rather steep, but in other directions its sides slope gradually. Its top is flat.

It is only on the slopes and at the base that the several rare minerals show themselves. The quartz and feldspar are much stained with red oxide of iron and some yellow and green uranium compounds and these stains constituted a good guide to their discovery.

The minerals which have been identified are: Quartz, Hyalite, Orthoclase, Albite, Muscovite, Magnetite, Martite, Gadolinite, Fergusonite, Allanite, Molybdenite, Cyrtolite, Fluorite and Gummite.

Quartz is rarely found crystallized at this locality. Orthoclase occurs massive and finely crystallized and in great variety of form. Twin crystals are common and crystals of huge dimensions, a foot or more in length, and smaller sizes abound. Albite is rare, crystals not above one inch in diameter were observed. Biotite is very abundant and many alteration products were noticed. Muscovite is quite rare and occurs as hexagonal implanted prisms. Magnetite is quite abundant, both massive and crystallized. Martite was very common but Gadolinite was the mineral which I came in search of and when I arrived at the town of Burnet, I called on the Banker, William Westfall, with a letter of introduction and told him I was looking for Gadolinite, the silicate of yttrium. He received me very kindly and said with good humor, "When people look for cattle in Texas they generally know the brand." Then pointing to a pile of rocks in the corner of his office, he said, "There is something without a brand which has been here a long time and some people call it obsidian." Picking up a specimen, I answered, "This is what I have come all the way from New York to hunt for in Texas—this is Gadolinite." Next day he accompanied me to the locality in his buggy, introducing me to a farmer near-by, where I remained two months collecting over two hundred pounds of Gadolinite and the rare minerals which were found to be ne wto science and which I will now describe.

Yttrialite: A new thorium yttrium silicate which I discovered associated with and often upon the Gadolinite and

but for its characteristic orange-yellow surface alteration it might have continued to pass for green Gadolinite. Of these yellowish masses, no crystals being observed, one weighed over ten pounds and fifty pounds in all were found.

Thoro-gummite: A hydrated uranium-thoro-silicate, of which only about two pounds were found. It is of a dull yellowish-brown color and its specific gravity varies from 4.43 to 4.54. It is easily soluble in nitric acid.

Fergusonite: A tantalate of yttrium-uranium. It was found in comparatively large quantities—150 pounds in all. It was associated with Thoro-gummite and Cyrtolite.

Nivenite: Was found intimately associated with Thoro-gummite and Fergusonite. It is a hydrated thorium-yttrium-lead-uranate, velvet-black in color and when powdered becomes brown-black. After ignition it turns blue-black. Its specific gravity is 8.01. Hardness 5.5. I only found massive pieces but some of these suggested that the species may be isometric in crystallization. It is more soluble than other kinds of Uraninite being completely decomposed by the action, for one hour, of very dilute sulphuric acid at 100 degrees. This mineral is allied to the rare varieties of Uraninite, Clevite and Broggerite, according to Dana's *System of Mineralogy*. Clevite was found in 1878; Broggerite in 1884; and Nivenite in 1889. Clevite was named after the Swedish chemist, P. T. Cleve; Broggerite after the Swedish mineralogist, W. C. Brogger; and Nivenite after Mr. Wm. Niven of New York City.

After the discovery of these rare minerals in Llano County, Texas, I visited our Sister Republic, Mexico, and in 1891, found another new species at Guanajuato, a sulpho-selenide of silver, which, on my recommendation was named Aguilarite, after the superintendent of the San Carlos Mine, Senor J. Aguilar, who showed me the greatest kindness and attention while examining the rich ores of the mine.

The chief purpose of my visit to Mexico was in search of a deposit of rose-colored garnets, a sample of which had been sent to Paris, France, and described in the *Journal of the Academy of Sciences*, in 1871, by Professor M. Damour, who stated that it came from the Rancho San Juan, Mexico. Saint John Ranch—I found Saint John ranches in every state all the way to Mexico City but when I reached the State of Morelos in 1892, south of the Capitol, I discovered the wonderful deposit which extends over a surface of 300x400 feet and it was estimated that there were 240,000 tons of the stone in sight. At the Chicago World's Fair, in 1893, it was given the highest award for beauty and novelty and described as follows: "It is valuable as a gem, decorative and building stone and displays cut and polished as well as in the rough, a new decorative stone from Xalostoc, State of Morelos, Mexico."

In origin it is a contact rock, produced by the action of intrusive igneous masses on limestone. The carbonic acid has been driven off and the stone now consists essentially of the three silicates—Wollastonite, Garnet and Vesuvianite. The garnet is the constituent which gives it its chief beauty and value. It is of a fine rose color, translucent, in dodecahedral crystals which often show a zonal structure. The rock shows good crushing strength, takes a fine polish and in quarter of an inch slabs the translucent garnets, when illuminated from behind, show a beautiful color.

My next mineral find was a large deposit of Wolframite, the rare ore of tungsten, in 1899, in the Victoria Mountains, New Mexico, twenty miles from Deming and four miles south of Gage, on the Southern Pacific Railroad. The mineral occurs in a well defined vein of white quartz in a limestone formation and the deposit can be traced from the outcroppings for over 300 feet.

Another exploration trip to Mexico was in 1900 and in the State of Guerrero, I found a gold region northwest of Chilpancingo, on the Rio del Oro, a tributary of the Balsas River, where Indians had been working placer gold deposits by the wooden pan for over a hundred years. A company had been working here a number of rich gold quartz veins and shipping selected ores that had given good returns, notwithstanding the enormous expense of mule freight—$70 per ton. Now that good roads are being built and peace being established all over the Republic under the leadership of President Pascual Ortiz Rubio, all these rich mining localities are now ready for the enterprising prospector.

In concluding this brief account of my mineral discoveries since 1879, I have shown that the richest field for rare min-

eral investigation to me was this great State of Texas, and as one of the Directors of the Houston Museum of Natural History, it will always be a pleasure to give every encouragement and information in my power to the mineralogist in efforts to search for the hidden mineral treasures, which is known to exist in boundless extent all over this favored Country, THE STATE OF TEXAS.

Field Museum Notes and News Items

Contributed by

THE FIELD MUSEUM OF NATURAL HISTORY,
Chicago, Ill.

Several huge amethyst specimens from Thunder Bay, Lake Superior, are on exhibition in the Department of Geology. One is about two and one-half feet long, a foot thick, and nearly two feet wide. There are also exhibited specimens of many varieties from all parts of the world.

An unusually well preserved and nearly complete skeleton of a pterodactyl or flying reptile, which lived more than a hundred million years ago, is on exhibition in Ernest R. Graham Hall of Historical Geology at the Museum. The specimen was unearthed in Kansas.

The shell of a giant oyster of prehistoric times is on exhibition in the Department of Geology at the Museum. It was found in Argentina. These oysters reached diameters up to twelve inches, and their shells weigh as much as sixteen pounds.

Fifteen large exhibition cases filled with many specimens of various marbles and other ornamental stones from many parts of the world, are a feature of the economic geology exhibits at the Museum. The specimens are large enough to display to advantage the characteristic patterns of each variety.

Typical examples of some of the earliest known forms of animal life are on exhibition at the Museum. These fossils represent the Cambrian age, going as far back as 700,000,000 years. Included are trilobites, an extinct crablike animal; fossil brachiopods or clam shells representing an animal whose family has survived to the present day; borings and tracks of a primitive worm, and fossil jellyfish. Also shown is the eozoon, a form whose origin is disputed, from a still earlier time. This last may be merely a rock structure of inorganic origin, or it may be the remains of a fossil plant resembling seaweed. If the latter, it is probably the earliest trace of life ever discovered.

The largest single meteoric stone ever seen to fall has just arrived at the Museum, it was announced, June 4th, by Stephen C. Sims, Director of the Museum. It was purchased and presented to the Museum by Stanley Field, the Institution's President. The new specimen will be added to the Museum's collection of meteorites, which, in number of falls represented, is the world's most comprehensive collection.

The new messenger from space, called the Paragould meteorite, arrived on earth February 17, 1930, at 4.05 A. M., according to Dr. Oliver C. Farrington, Curator of Geology. It fell at Paragould Ark., on a farm owned by Joe H. Fletcher. The stone weighs 820 pounds, being 175 pounds heavier than any previously recorded. In falling it penetrated hard clay to a depth of nine feet.

The largest stone previously known which was seen to fall from a meteor

weighs 646 pounds, Dr. Farrington states. This fell at Knyahinya, Hungary, on June 9, 1866, and penetrated the earth to a depth of eleven feet. It is now in the Vienna Museum.

"The meteor which dropped the Paragould stone, now in the Museum, attracted attention in three states—Missouri, Illinois and Arkansas," Dr. Farrington says. "Its light was so bright that persons in St. Louis who saw it thought it was an airplane going down in flames. It burst with detonations which were heard as far north as Poplar Bluff, Missouri, and as far east as Covington, Tennessee. The meteor came from a southwestern direction. At Paragould nearly everyone in the town was awakened by the detonations, and live stock was stampeded.

A smaller stone, weighing 80 pounds, which fell at the same time, was discovered about three miles from Paragould, by a farmer who noticed earth freshly thrown for a distance of thirty feet. The stone had also made a furrow in the northeast direction. It was found at a depth of thirty-four inches. Finding of this stone led to the search for others, and a month later, on March 16, the large mass weighing 820 pounds, now at the Museum, was discovered."

A group of skeletons of the leptomoryx, a prehistoric deer no larger than a terrier dog, is on exhibition in Ernest R. Graham Hall of Historical Geology at the Museum.

An exhibition of the various minerals which have been found useful in radio communication is a feature of the Museum's economic geology collection.

A fine series of star sapphires is on exhibition in H. N. Higinbotham Hall at the Museum. Also displayed are large and attractive stones of blue and yellow sapphire, the largest weighing 99½ carats.

Many specimens are brought to the Museum by their discoverers in the belief that they are fossils, which are not fossils at all but accidental imitative forms called simulacra. Some of these latter, nevertheless, are often of real interest and value, according to Henry W. Nichols, Associate Curator of Geology at the Museum.

"Waterworn pebbles are often mistaken for fossil eggs, and many supposed fossils of a great variety of objects ranging to axes and even to hams are of this nature," says Mr. Nichols. "The most curious example wasa piece of waterworn limestone which did have a superficial resemblance to the fossil baby monkey it was thought to be.

Pieces of slag found in outlying districts are often brought in on the assumption that they are meteorites. The greater number of supposed fossils brought to the Museum are concretions, or aggregations of minerals deposited from solution in many curious shapes, some of which in their general outline resemble many familiar objects. One common kind of concretion is often mistaken for a horse's hoof. Others are brought in as petrified human arms, legs, and feet. Still others are mistaken for turtles or for birds's nests.

On the other hand, actual fossils are often mistaken for petrifactions of quite a different character. Thus a long, thin, shell was thought to be a fossil bird's beak. The fossil so-called 'honeycomb' coral is often mistaken to be a petrified honeycomb, and the long jointed shell of a fossil mollusk is thought to be petrified backbone.

Some of these specimens prove to be of more interest and value than they would be if they were actually what they were mistaken for. A supposed fossil hoof, for instance, proved on examination to be a hitherto unknown species of fossil clam."

In order that certain minerals such as realgar, proustite and others, which would fade or change color if continually exposed to light, may be exhibited and made available for study, a system of covers inside the cases which may be automatically lifted by the student is installed at the Museum.

The systems to which minerals crystallize, and the varying development of crystal form in each system, are well illustrated in the William J. Chalmers crystal collection which is on exhibition at the Museum.

Watkins Glen

By

EUGENE W. BLANK,
State College, Penn.

The village of Watkins Glen is situated at the southern end or head of Seneca Lake, the largest of the numerous Finger Lakes of Central New York and the second deepest lake in the United States. The lake is 618 feet in depth at its deepest portion, is thirty-six miles long and from one to three miles in width.

Watkins Glen Park is within the village limits approximately ten minutes walk from the center of the town. The entrance to the gorge is on Franklin street and the glen extends westerly into a steep hill for approximately three miles.

The entrance to Watkins Glen Park is marked by a massive wall and arch of rough granite boulders. Passing beneath this arch the visitor comes into the Entrance Amphitheatre. To the right and left towering cliffs gradually narrow into a deep winding gorge containing several waterfalls, cascades and deep limpid pools. One enters the gorge by means of an entrance tunnel hewn through solid rock. This tunnel opens on to Sentry Bridge and here the visitor catches a first view of the Entrance Cascade as it goes tumbling under the bridge. In the very early days of the settlement of the town the glen was the site of several mills and was known as "Mill Creek." From Sentry Bridge one can still see a small tunnel used as a mill race outlet.

Passing by the shimmering cascade the trail leads directly back and under the the pool below the falls being outlined in the shape of the heart of Minnehaha. Continuing to follow the trail Cavern Gorge is entered and the Cavern Cascade comes into view. This is without doubt the most beautiful of all the falls in the gorge making a long, silvery drop into a circular ringed pool below where it momentarily whirls before escaping. The trail leads directly back and under the falls, thence through a short tunnel to Diamond Falls, the Glen Cathedral, and the Pulpit Rock. In the Glen Cathedral the towering walls widen apart and the stream broadening out murmurs gently over massive flagstone slabs. Pulpit Rock is the highest point of the wall of Cathedral Glen being over two hundred feet above the water level below.

At the upper end of the Cathedral Glen is the Central Cascade, sixty feet in height, and tumbling with reckless abandon into the deepest pool in the glen. Next in order come the Glen of the Pools and Rainbow Falls. At the latter point several small streams come tumbling down the southern wall of the gorge falling like a misty veil into the pools below. If one is fortunate in getting the right position one may see a brilliant rainbow as the sunlight filtering into the gorge strikes the misty spray.

Passing beneath Rainbow Falls, Spiral Gorge and Pluto Falls come into view. Next comes Elfin Gorge and "One Mile Point." Here the gorge widens considerably and the greatest descent of the stream has been passed. For the next half mile or so the stream flows languidly over the solid step-like layers of shale with here and there a small drop and a quiet mirror-like pool.

At the very upper end of the gorge the New York Central Railroad bridge comes into view. This is a steel trestle crossing the gorge; one hundred and seventy-five feet above the stream bed and approximately five hundred feet in length. At this point the trail leads out of the gorge by a series of steps (135) known rather fancifully as Jacob's Ladder.

One has a choice of retracing the gorge or descending to the entrance by means of the Indian Trail. The latter is a slowly descending path that offers many beautiful views of the gorge from the upper rim. At its lower end a steep flight of steps leads to the Entrance Amphitheatre.

The Payne Studio, Watkins Glen, N. Y.

MINNEHAHA FALLS, Watkins Glen. (Cavern Cascade in the background.)

The Payne Studio, Watkins Glen, N. Y.

CAVERN CASCADE, Watkins Glen.

The Payne Studio, Watkins Glen, N. Y.

RAINBOW FALLS, Watkins Glen.

Above the railroad bridge the gorge has not been developed. There the stream flows through three large basins popularly known as the "punch bowls". The glen has lately been made one of the State Parks of New York and future developments will make these basins into small lakes by the erection of suitably placed dams.

Watkins Glen has a charm peculiar to each season of the year. In winter solid walls and shafts of fluted green and blue ice greet the visitor. In places where the trail passes under the various falls and cascades it becomes a narrow tunnel entirely closed by glittering, crystalline ice. During the spring floods the gorge becomes a roaring, tumbling torrent of rushing water and wildly dashing spray. In summer and fall, the vibrant torrent of water is hushed and the small clear stream wanders quietly along dropping now and then with a musical trill into some shadowed pool.

The geology of Watkins Glen and the surrounding region is extremely interesting. Watkins Glen lies entirely within the area of the Allegheny Plateau and the rocks are all derived of Paleozoic sediments. With the close of the Paleozoic Era, these rocks were brought above sea level in a comparatively undisturbed condition. The entire region was later visited by continental glaciers of which the Wisconsin Glacier was instrumental in carving out the now famous Finger Lakes of New York.

The old stream of Watkins Glen is thought to have been filled up by the glaciers, as traces of the latter are to be found above the railroad trestle and on the northern rim of the present gorge. Watkins Glen as it is known today is the work of water and erosion. It presents one of the most interesting examples on a large scale of what are known as pot-holes. The latter are deep pools carved in solid rock by the erosion powers of whirling waters and loose stones. Watkins Glen is entirely made up of confluent pot-holes.

Throughout its greatest length the glen walls are distinctly circular with projections showing where the weakened walls between the ever increasing pot-holes finally broke down. At the present time the pools at the foot of the larger falls are splendid examples of pot-holes. The pool at Entrance Cascade is twelve feet deep. At Cascade Cavern the pool is now eighteen feet deep, but before the debris of rock made from cutting the tunnel was thrown into it, it had a depth of about sixty feet. At Central Cascade the pool is twenty six feet deep.

The rock formations in the gorge belong to the Portage formation; the lower part comprise the Cashaqua shale group of Ithaca and Enfield shales. Sherburne flagstone, Parrish limestone and Rhinestreet shale. Topping this is the Hatch shale and flagstone group. Along the shores of Seneca Lake is found the Genesee or Genundewa group.

The village of Watkins Glen is built largely on alluvial soil deposited by the glacier and washed down from the neighboring slopes. Beneath the village it is estimated to be over eleven hundred feet deep. Salt and natural gas are found near Watkins Glen at a depth of eighteen hundred feet. Watkins Glen is also noted for its mineral springs.

E. H. Cienkowski, science teacher of the Northeast High School in Philadelphia, Penn., left June 29th for an extended trip through the west and southwest. He is accompanied by two of his proteges of the mineralogy club, Fred Reinitz and Edward Graham, who are also members of the Rocks and Minerals Association.

The object of the trip is the collection of minerals and among the well-known localities to be visited are: the fluorite fields of southern Illinois; the zinc mines around Joplin, Mo.; Hot Springs and Magnet Cove, Ark.; Magdalena, Kelly, Organ Mts., Carlsbad Caverns, ets., in New Mexico; Morenci, Bisbee, Globe, Holbrook, Meteor Crater, Grand Canyon, etc., in Arizona.

This is the biggest trip undertaken by Mr. Cienkowski solely for the collection of minerals and we are very sure it will prove successful in every way. The trip is being made by auto.

Some Notes on Precious Stones

INSTITUT. F. EDELSTEIN FORSCHUNG[1],

Idar, Germany.

The interest which the blue zircon (Starlite[2]—a gem unknown several years ago) has created and the high appreciation it met with by the public gives an opportune moment to say a few words regarding the colors of precious stones and their changes by artificial means, as i. e. heat. Almost every collector knows that the blue zircon owes its color to a heat treatment which the gray-green variety undergoes in order to yield the more or less pure blue stone with some tint of greenish color. Anyone possessing a blue-green stone with a slight muddy color can produce the clear blue tint by simply heating the stone in a test tube until the muddy shade disappears. As long as the stone is kept out of the sunlight it will retain its clear color, but if brought into the rays of an ultra violet ray lamp or into the sunlight, it will soon take on its old appearance. Not all blue zircons regenerate their old color to a more or less degree but some appear to be remarkably stable, especially those with a deep blue color.

By a similar method of the application of heat many other gems are prepared for the market though the process of change seems to be of a different nature than with the zircon where it is almost entirely photo-electric. With the stones listed below a number of processes seem to bring about a change of color jointly. Besides, all these colors are absolutely fast and cannot be changed back to the original except by very complicated means and then only in one or two cases. Sunlight does not affect these pyro-colors at all.

The temperatures which bring about these changes range from 300° to 650° C and the process of treating these stones by heat is most hazardous, as the slightest flaw or crack or the most minute enclosure of gas or air tends to crack the stones at temperatures beginning at about 250° C. Formerly the cutters used to bury the stones in dry sand and fire them in a pot of burnt clay on a stove. Not being able to either measure or regulate the heat, the results were not too encouraging and often the stones were completely discolored or even totally destroyed—porcelain-like cinders, worth no more than the sand in which they were burnt, was all that were left at times of formerly precious stones. Now the electric furnace and exact temperature measuring instruments permit the application of scientific principles to the heating of these gems and the losses by cracking have greatly diminished and overheating is completely eliminated.

1—Institute for Precious Stone Research. The Institute will gladly furnish information about heating stones. Return postage should be enclosed.

2—Name given by Dr. George F. Kunz.

Name of Stone	Original Color	Pyro-color
Smoky Quartz	Brownish	Colorless-white
Smoky yellow quartz	Yellow-brownish	Yellow to golden (Citrine)
Brownish Amethyst	Brownish-purple	Yellow to golden (Topaz)
Reddish Amethyst	Red-brownish-purple	Orange to red (Topaz)
Dark red Tourmaline	Red-brownish	Light pink Tourmaline
Dark green Tourmaline	Dark moss-green	Blue-green—light-green
Aquamarine	Green	Light blue
Rose Beryl	Salmon color	Pure rose color (Morganite)
Pink, Precious Topaz	Orange-red	Deep pink to rose

A Review of Radioactivity and Geology

— By —

THOMAS W. FLUHR, A. B., A. M.

Through the long ages of geologic time, from the Pre-Cambrian to the present, there have been at times great volcanic eruptions. In Iceland, in Hawaii, in Alaska, in Sicily, and in numerous other places, even today boiling lava and hot ashes are poured out over the surface of the earth. What source of energy supplies the terrific heat which melts great amounts of rock and hurls its debris far and wide? An old theory has been that the earth is a slowly cooling globe, once a molten mass, and that volcanism represents its dying stages. Scientists of the first rank, such as Lord Kelvin and Jeffries, have discussed this theory and considered its varied phases. The advances in physics and chemistry eventually brought a new factor into consideration. This is radioactivity. Discoveries in this field have suggested it as another possible explanation of the internal heat of the earth.

Among the shrewd scientists of the nineteenth century was Sir Norman Lockyer. In 1873 he hazarded a guess, if we may call it a guess, that the chemical elements might dissociate or break up into other elements. Much later a similar theory was put forth by F. W. Clarke. Modern research has shown that this does take place and that certain elements do break up into others of lower atomic weight. The most well-known of these is radium. These elements in breaking up release large quantities of energy, much of it in the form of heat. Attention was first called to these elements by Henri Becquerel, and radium itself was isolated by Professor and Madame Curie. We must not however limit our ideas to radium alone, for uranium and thorium are known to be disintegrating and potassium has been shown to be radioactive, while several other elements are under suspicion.

Radioactive substances give off three kinds of radiation. Alpha rays are positively charged atoms of helium. Beta rays are electrons, traveling at high speed. Gamma rays are short ether waves akin to X-rays. Besides these radiations, heat is given off. One gram of radium releases heat in quantity experimentally determined as 108-110 calories per gram per hour. This differs slightly from the calculated heat which is 118 calories per gram per hour. Uranium and thorium also release energy in disintegrating. All these substances must then be endothermic substances and must have absorbed great amounts of energy from somewhere when they were formed.

The rate of disintegration is, as far as we know, unaffected by any conditions. It is as active at -200 degrees C. as at 2000 degrees C. Rutherford and Petavel tested this by subjecting radioactive material to the temperature produced by exploding cordite in a bomb. A supposed temperature of 2500 degrees C. and a pressure of 1200 atmospheres had no effect.

When a radioactive substance is mixed with a phosphorescent salt the salt gives off light, but according to Duane, who investigated this phenomenon, the same amount of heat is given off as before. There is no appreciable absorption of energy by the salt, nor do the rays liberate an appreciable amount of sub-atomic energy. If these results are confirmed by further investigation they constitute a remarkable situation.

The rate of disintegration of radioactive substances is very slow. Rutherford estimates the half life of radium as 1760 years. In this connection one must consider the possibility of the rate of disintegration being influenced by other radiations, as has been pointed out by Menzies and Sloat. Uranium breaks down through several stages into radium and this successively disintegrates to lead. There was some question raised as to this, for the generally accepted atomic

weight of lead did not agree with the calculated density of the end product of radium, but the work of T. W. Richards on isotopes removed this difficulty.

It would appear significant that many of the elements which give off electrons easily are in the same class of the periodic table; that of the alkalies. In Mendeleef's periodic table, sodium, potassium, rubidium, and caesium are in group 1. Because of their electronic emissive power the three former are used in photo-electric cells, the last has been used in the filaments of vacuum tubes, and sodium has been used in the "Sodion tube". Zinc, barium, and radium are in group 2. The first gives off electrons under the influence of ultraviolet light, the second is used as a source of electrons in the filaments of some vacuum tubes, and the Beta rays of radium consist of electrons. The resemblance of these elements to one another in their electronic emissivity is doubtless due to a similar unstable configuration of the electrons in the atoms.

It has been suggested that all elements are undergoing radioactive transformation. If this theory is true it leads to an interesting conclusion. As the transformation seems to take place from the heavier elements to the lighter, the eventual residue will consist of hydrogen and helium, and these because of their high velocities will gradually escape from the influence of gravity and disappear into space. Unless transformation from lighter to heavier elements takes place this means gradual disintegration of the earth.

The suggestion has been made that the heat of the sun and stars is due to atomic disintegration. If so it should be due to the breaking up of the lighter elements, for by spectroscopic analysis no radium, thorium, or uranium are found in the sun. They also seem to be lacking in the gaseous nebulae. It is stated by Joly that if solar heat is supplied from radioactive energy derived from elements which have become radioactive under thermal conditions prevailing there, then such induced radioactive disintegration would be attended with explosive phenomena on a great scale. This statement, if true, might be used to explain the separation of the earth from the sun according to the nebular hypothesis, and to explain the solar prominences; sun spots.

There seems to be some dispute as to the distribution of radioactive material in the earth. In respect to crystallized uranium and thorium minerals, some investigators state that these are found only in pegmatitic modifications of granitic and syenitic rocks. While rocks show great individual variation in radium content, on the average it may be stated that acid intrusives have a higher radium content than basic intrusives. In some basic rocks such as those of the Deccan, consistent quantities of radium are found. Many mineral springs exhibit radioactivity, and helium, the gaseous product of disintegration, is found in some gas wells and coal mines. Tests of rocks from the Simplon tunnel tend to show that the amount of radioactivity increases with depth. According to Joly, the mean radium content of igneous rocks is 5.5×10^{-12} grams radium per gram rock, and the mean radium content of sedimentary rocks is 4.3×10^{-12} grams radium per gram rock.

Attempts have been made to estimate the amount and distribution of radioactive substances from the temperature gradient as we go deeper into the earth, and from the relation of observed temperatures to radiation. This leads to the conclusion that the radioactive elements must be distributed in a thin shell on the surface, for otherwise, if they were uniformly distributed, the heat produced would be enough to render the interior liquid. Some investigators report that the average radioactive material if uniformly distributed through the earth would account for more than twice the heat which is lost by radiation. Rutherford states that 4.6×10^{-14} gram radioactive material per gram rock would account for all the heat we know to be escaping by radiation. Comparing this with the average radioactive content of surface rock it is to be seen that the surface rock contains a much larger quantity than this. If we assume that the surface layer contains all the radioactive material necessary to account for the heat radiated by the earth, then the thickness of this layer would not be more than 70 miles and perhaps much less. There is little reason to believe that radioactive material is uniformly distributed. It is probably heterogeneously distributed in the surface crust.

Seawater does not contain much radioactive material. According to Eve the average amount is $6x10^{-16}$ grams radioactive material per gram seawater. The amount of radioactivity of oceanic deposits is extremely variable. Some of the very old deposits such as the radiolarian ooze and the red clay deposits contain a rather high percentage of radioactive material.

According to some investigators the ionization of the air over the sea is approximately the same as over the land. As this ionization has often been ascribed to radioactivity it is to be noted that the quantity of radioactive material in seawater is small. The ionization of the air is much better explained by the radiations of very short wavelength described by Millikan.

The small amount of radioactive material found in sea water, and the larger quantity found in the deep sea deposits is generally explained by the belief that the radioactive material, being heavier, is precipitated to the bottom.

The radioactivity of the atmosphere has been investigated by three methods:

1. Determining the ionization of the air.

2. Exposing a negatively charged wire and allowing radioactive material to collect on it.

3. Collecting radium emanation from the air.

The first method is open to grave error, for the ionization of the air may be due to other causes. The amount of radium emanation or radon in the atmosphere is quite variable. As high as 1110 micromicrocuries radon per cubic meter has been reported from Innsbruck, Austria, and as low as .3 micromicrocuries per cubic meter from the Southern Ocean. In general the air over land areas contain much more radon than that over the ocean. This is to be expected in view of the relative quantities of radioactive material in the land and in the sea.

Volcanic action shows that some parts of the earth's interior are hot. But most volcanic eruptions are comparatively small. The maximum amount of lava given out at any one eruption does not seem to have been any greater than three cubic miles. Volcanic eruptions seem to be repetitive. Magmatic reservoirs appear to be no more than three miles deep, and most of them are supposed to be no more than one or two miles. According to Joly, the radioactivity of the rocks in the upper crust is insufficient to produce a temperature near that of volcanoes, 1200 degrees C, especially near the surface. We must look for another source for the heat. The friction of tides in the earth, compression, and chemical action, would seem to furnish some explanation.

We do not, of course, know anything about the temperature at great depths. If the earth's temperature were due entirely to radioactivity we should certainly find it much hotter than it is, for the radioactive elements being the densest, should tend to sink to the interior. If there is much radioactive material in the interior there is of course the possibility that under the conditions of temperature and pressure prevailing there, the disintegration is suspended. Radioactive disintegration may be entirely contingent on irradiation of some sort, and for that reason much material may disintegrate only at or near the surface.

Lord Kelvin's calculations show that the earth is a rigid solid. This idea is supported by the evidence of earthquake waves. It has been suggested that the core of the earth is made up of iron-nickel alloy. Becker supports this view, stating that tidal instability eliminates the possibility of a liquid core. According to Daly, if radioactivity supplies heat to the earth, then the shell of the earth could not have become crystallized without a temporary lull in the atomic disintegration. Dutton seems to favor the idea of radioactivity. According to him, if the horizon of molten lava depended on the secular cooling of the earth, it would be 30 to 40 miles below the surface. He argues that this cannot be so, for it is difficult to conceive that the molten lava will be 30 to 40 miles below the surface at one point and only two miles or less below the surface at another point. For this reason he looks on the idea of radioactive disintegration as a much better explanation than that of a cooling earth.

Arrhenius presents a novel theory. According to him, the earth possesses a solid crust and a gaseous interior. This view seems to be satisfactory from the

standpoint of the physicist, and agrees with the known behavior of the earth's interior. It is perhaps unfortunate that the term "gas" was used. Under such pressure as this gas must be, its behavior would be rather different from our ordinary conception of a gas, and would perhaps come nearer our idea of a solid. This theory of Arrhenius has much to recommend it, and it agrees with most of the facts; the main trouble with it seems to be one of language rather than of ideas.

There seems to be little or no evidence to support the idea that radioactive disintegration is taking place deep in the interior of the earth, and some evidence against it. The earth would appear to be a thin crustal shell, bearing a superficial layer of radioactive material, and passing downward gradually through a zone of weakness (not sharply defined), to a center which behaves like a viscous, somewhat fluid, supercooled liquid, which may be compared to glass, which, while retaining its elasticity, has nevertheless a certain amount of fluidity.

Joly has attempted to link radioactivity with isostasy. He reviews the arguments of Darwin in support of the idea that the earth cannot have a fluid core. He finds also that the basalt which wells up from substratum is radioactive, although less so than granites. If the basaltic substratum were at any time near its melting point, and the heat supplied to it by radioactivity were conserved, than in some 25 or 30 millions of years it would become liquified.

In considering the effects of radiation it becomes apparent that there can be little escape of heat from beneath the continental masses, for the continental layer is itself radioactive. Under the continents then the basaltic substratum should be at or near its melting point. The ocean basins are however cooled by the overlying water. As the basalt beneath the continents melts it increases in volume and tends to put a tension on the crust. Solar and lunar tides also tend to produce crustal movements, especially in equatorial regions. Convective movements of the basalt cause the ocean floor to be reduced in thickness. The margins of the continents become lines of weakness, which yield and allow great floods of basalt to pour out, such as the enormous lava flows of the Deccan and of the Columbia River. Joly brings up the question of Schuchert, "Why are there periodically rising borderlands with geosynclines along their inner sides?" Joly answers that the differential movement of the ocean basins and the continental masses causes the formation of lines of weakness and geosynclines result. The greatest geosynclines have faced the greatest oceans. As the great lava flows take place the continental masses sink and the oceans trespass over the land. The result of this is that the basaltic magma is cooled, and the outer crust descends. Meanwhile the ocean floor has increased in area as a result of the lava flows. As the ocean floor sinks it exerts a terrific lateral stress on the continental margins. Osmond Fisher has calculated the amount of stress which could be produced in this manner as 830,000 tons per square foot. This force would be irresistible, and an orogenic upheaval results. At the same time, as the basaltic substratum cools, its density rises, and the continental masses rise. The oceans then withdraw from the land. The net result is a rising continent with mountain masses along its borders. Joly makes much of the point that the greatest mountain ranges face the greatest oceans. This sounds rather plausible. It might be pointed out however that no real mountain ranges exist on the eastern side of South America, facing the great South Atlantic. In North America such ranges do exist. The narrower and shorter lived geōsynclines appear to face the smaller oceans such at the North Atlantic and Arctic Oceans, while longer enduring and more diastrophically active geosynclines face the great Pacific Ocean.

If the basaltic substratum is considered to be no more than 70 miles deep then the volume change attendant on liquifaction would increase the earth's area some 650,000 square miles, which appears entirely sufficient to account for the orogenic upheavals.

At the beginning of cooling of the basaltic substratum, the lateral forces tend to displace the contents of the geosynclines both down and up, but mainly down, but the rise of the continental masses as a result of final cooling of the magma would, according to the theory of isostasy, produce a final vertical uplift.

Many flaws can be found in the theory of Joly, but it shows some correspondence with facts which seem difficult to explain on any other basis.

Attempts have been made to use radioactivity to determine the age of the earth. The usual methods are to find the amounts of uranium and thorium in a mineral and the amount of lead or helium. Then, knowing the rates of disintegration, the age of the mineral can be determined. The results have been promising. In most cases relative correlations can be established between the age as determined by this method and the assigned position of the rock in the geologic column. Occasionally discordant results are obtained. This is due largely to the fact that there is no means of determining whether or not the amounts of lead or helium in a mineral have changed through other causes. Moreover we do not know the amounts of these originally present. We have no way of being certain that the rate of disintegration is always constant. There is a possibility that it may have varied depending on conditions within the earth. Was there originally any lead or helium in the sample, or has material been added or removed? The possibility of this has come more to the fore in late years as the result of the discovery of helium in natural gas. We certainly can not ascertain the age of the sand where gas occurs from the amount of helium present. The ease with which lead goes into solution and is dissolved and reprecipitated is an objection to the use of lead in age determinations.

E. Czako shows that the amount of helium discharged yearly from two wells examined would require the disintegration of 165,000 and 28,000 tons of radium respectively. According to Moreau and Lepape the helium evolved from a coal mine was 12 cubic meters a day. The radioactivity of the coal did not account for anywhere near this amount. G. S. Rogers gives a rather complete discussion of similar cases. It must be concluded that trying to estimate the age of the earth by radioactivity is a somewhat doubtful procedure, but the other methods also are subject to grave errors.

A very interesting subject for speculation is the case of the moon. This would appear to be made up of material similar to that which makes up the earth. Yet it seems to be a cold body. If it is composed of material like that on the earth we would expect that radioactive disintegration would be taking place there. The fact that the moon is a cold body is an objection to this. It may be argued that the moon has a larger area per unit volume, and that it has no atmosphere, both of which would cause more rapid loss of heat. It might also be argued that if radioactive disintegration is dependent on irradiation of some sort, as has been suggested by Menzies and Sloat, then the lack of a protective atmosphere has resulted in the disintegration of all the surface layer of radioactive material, so that none remains as a source of heat.

Radioactivity has furnished a fertile field for speculation. Its investigators have been well supplied with data, often of doubtful value, and in a few cases absolutely contradictory. To summarize:

1. There are many elements in the process of disintegrating, possibly under the influence of cosmic radiation.

2. We have at present no means of influencing the rate of disintegration to any appreciable extent.

3. There seems to be some evidence that intra-atomic energy supplies at least part of the heat of the sun.

4 Radioactive substances appear to be heterogeneously distributed. If they are not concentrated in a thin layer at the surface of the earth then only the surface layer appears to be disintegrating. Although later investigators find less radioactive material in the earth than Joly, yet the amount would evolve an enormous supply of heat.

5. The internal heat of the earth is due to a number of causes. Radioactivity plays a great part, but some of the heat is due to such causes as chemical action and electrical effects.

Gems of the Southwest

By

NELL LOUNSBERRY

TURQUOISE

Eight centuries ago in Persia, near Nishapur, there was being mined an opaque bluish-green stone. This was sent to Europe by way of Turkey and from this fact was named "Turquoise" by the French, being used principally in costume jewelry of the time. The Sinaitic Peninsula was supplying Egypt with the same stone. In the far East it was being engraved with Persian and Arabic inscriptions—generally passages from the Koran—gems so engraved being worn as amulets. Turquoise, possessing the peculiar characteristic of changing color has ever been held in superstitious awe by primitive races, the Orientals believing that when the stone paled, the wearer was endangered. Because of this "forewarning" the gem has been a favorite in the Orient since prehistoric times.

When the early explorers returned from the New World several hundred years later, they brought tales of a wonderfully prized stone which the Mexicans called Chalchihuitl. Those obtained in Mexico were without doubt turquoise but there seems more probability that the gems found in South and Central America, and to which they gave the same name, were green jade.

The stone was held sacred by Montezuma, as it still is by his people, being regarded as emblematic of success and worn to preserve health. Other Mexican Indian tribes used it in inlaying obsidian ornaments and for mosaic with iron pyrites. It is possible that much of the turquoise used in this manner was obtained from tribes to the North, in what is now Arizona and New Mexico, for the mines twenty miles from Santa Fe, New Mexico, show evidence of having been worked extensively for a great many generations, although only by means of fire and stone implements.

In the last quarter-century, as the supply of Persian turquoise began failing, due to primitive and wasteful methods, American mining interests began developing these ancient mines of the southwestern Indians. Today, the industry has increased until a large share of the world's turquoise is taken from Los Gerrilos, New Mexico; Chocise County, Arizona; and in lesser quantities in Colorado, Nevada, and California, being generally located in narrow seams and crevices formed in volcanic rock.

As the demand for the gem has increased, ingenious counterfeiters have devised ways and means of cleverly faking the stone, one method by celluloid but more commonly by what is known as bone turquoise or odontolite which is fossil bone colored blue by phosphate of iron. Fortunately this is easily distinguished under the microscope and also by its failure to yield a blue color when subjected to hydrochloric acid and ammonia. Turquoise in the natural rock has recently been extensively cut for gem stones, being sold under the name of "turquoise matrix." Even this has been counterfeited by imbedding a bit of natural rock in the fraudulent celluloid foundation.

Its color, while ranging from light blue to green, is most greatly sought after when appearing in robin's egg blue. Due to the peculiarities of the stone even this fine color occasionally fades and turns green because of gradual evaporation of the moisture contained. Heating or exposing to the elements quickly brings about this change.

Scientifically, turquoise is a hydrous phosphate of aluminum containing a small amount of copper; hardness 6 and specific gravity 2.75.

Corundum Hill and the Old Rhodolite Mine of Macon County, N. C.

By

FRANKLIN G. MCINTOSH,
Franklin, Penn.

After a winter spent in the sunshine of Miami Beach where there was slight opportunity to engage in my favorite hobby of "rock hunting," I determined on my way home by motor, to gratify a desire of long standing and visit some of the famous mineral localities of northern Georgia and western North Carolina.

Knowing from past experience that it was next to useless to attempt to find anything of value or interest without having definite goals and local guides arranged for in advance, I took the liberty of writing a firm of jewelers in Ashville, North Carolina, for such information. They were kind enough to refer me to Mr. Burnham Colburn of Biltmore Forest, who has a most extensive collection of the minerals of North Carolina, and a collector of Cherokee Indian relics that is probably unequaled in any private collection in this country.

I found Mr. Colburn to be a most courteous and cultured gentleman, and through him I made some connections and easily located some of the old mineral workings of North Carolina, from which I collected considerable material of interest.

One of my most interesting days was the one I spent at Franklin, Macon County, North Carolina. Those of us who are at all interested in gem minerals know that it is here that the famous Corundum Hill is located and from this section come the only true gem rhodolites, that beautiful rose-red variety of garnet, that is an inter-mixture of the almandite variety with the pyrope. To my mind it is one of our most beautiful gem stones and the fact that it is found in only one place in the world adds much to its interest. Having always admired the rhodolite so greatly, I was particularly pleased to think that I was going to have the opportunity of hunting for it in the one place where it is to be found.

Accordingly one Sunday morning, I met by appointment the manager of one of the largest producing mica mines in that section of the country and together we drove out a few miles to the "Old Rhodolite Mine," having stopped en route to pick up the foreman of the mica mine who was a native of that section and was to act as our guide. After a short climb up the mountain we arrived at the mine, which was not an extensive workings and showed evidence of quite recent operations on a small scale. A great many gem stones were taken from this mine some years ago but it was closed down many years until last year when Mr. Colburn of Ashville opened it up and, making a considerable cut to drain the pit of water, operated it for some time and took a good many stones of fair size from it.

Our trip was made in the hope that we might find some nice specimens but we hardly expected to do so in the short time we had for our visit. We found that some one had evidently been working there quite recently and by washing his dumpings we were able to get a nice lot of small pieces, only a few however, were large enough to cut. We did, however, later get in touch with the man who had been working the mine and I secured about sixty pieces of fine gemmy material, all of which will cut, the stones probably averaging about two carats each.

After having luncheon in town, we drove out in the other direction to the famous old Corundum Hill Mine. This mine was first opened up in 1871. There was an attempt made to mine for gem

material but it was found that this would not pay and for a long time the mine was operated for abrasive purposes. The advent of carborundum was the death warrant for natural abrasives and it has been many years since the mine has been operated at all.

After a short climb up the mountain we came to the remains of the old mill. This has all been dismantled and is rapidly falling to ruin. A portion of the old building is used as a cow stable by the family living on the place, but very little remains to show that this was once a busy hive of industry.

The hill above the mill site is almost literally honeycombed with diggings and the remains of old tunnels. There must have been very extensive operations here at one time but now the dumps are largely covered with shrubbery and small forests and the tunnels have fallen in. There was one tunnel still in good preservation and it was here that we found considerable weathered rock containing corundum crystals. These crystals showed the typical corundum formation but were not of gem quality. We amused ourselves for some time by knocking these crystals out of the comparatively soft rock and I came away with a pocketful of them as souvenirs of our visit to Corundum Hill. I afterwards obtained a few crystals that will cut fairly good gem stones although they are not of first quality nor entirely clear. I expect to make some pretty good looking cabochons from them, however, and a stone of only fair quality that was found on the ground by one's self is often more gratifying than one of better quality that was purchased already cut. At any rate, whenever I find mention of Corundum Hill or the old Rhodolite Mine of Macon County in my reading in the future, I will know what they now look like and can picture in my mind's eye their appearance at the time of their greatest activity.

The Sluice Box

— By —

A. Riffle

In looking through some old correspondence I came across a post card that I received from "Old Bill" several years ago when some stock man induced him to go back to Chicago with a train load of beef. As usual he expressed his thoughts with few words, "This is some Camp!"

A very hot summer will be behind us when this appears in print and the days and evenings for enjoying minerals will be just ahead of us. This is the time to begin looking up the vacant spaces in your cabinet and to consider the offerings of the dealers and above all to start boosting for Rocks and Minerals again.

It is too bad that the drive for a monthly made such a poor showing when just a little effort from each one of us might have put it across. How collectors and subscribers could have allowed such an excellent opportunity to slip by without showing some signs of interest is a mystery. Up to July 25 there were 49 subscribers who co-operated—30 sent in 117 pledges and 19 sent in 38 new subscriptions.

CLASSIFIED SUMMARY OF REPLIES

Pledges: Ariz. 3, Calif. 18, Conn. 3, Iowa 6, Me. 8, Md. 6, Mass. 3, Nev. 2, N. Mex. 3, N. J. 4, N. Y. 5, N. C. 10, Ohio 5, Ore. 6, R. I. 3, S. D. 5, Texas 15, Vt. 10, Wyo. 2. Total 117 pledges from 30 subscribers.

Subscriptions: Alaska 1, Calif. 4, Colo. 1, Conn. 2, Ill. 5, Md. 1, Mass. 3, Nev. 2, N. J. 6, N. Y. 5, Ore. 1, Pa. 4, S. C. 3. Total 38 new subscriptions from 19 subscribers.

Museums of the World

This is the continuation of an interesting series of articles on famous Museums of the world, noted for their mineral collections.—*The Editor.*

THE FIELD MUSEUM OF NATURAL HISTORY

The Field Museum of Natural History in Chicago was founded in 1893 as a result of a $1,000,000 gift for the purpose made by the late Marshall Field. At the time of his death in 1893 Mr. Field bequeathed to the institution an additional $8,000,000, of which $4,000,000 was alloted toward construction of the present building and $4,000,000 toward endowment.

The Museum is incorporated under State law, and its active control rests in the Board of Trustees, with President, Secretary and Treasurer. The executive of the Museum is the Director, under whom there are five Curators and many divisional Associate and Assistant Curators, and a large staff of other workers.

The Museum has four Departments responsible for the exhibits within the building—Anthropology, Botany, Geology and Zoology. There is a fifth department, the Department of the N. W. Harris Public School Extension which prepares and circulates among the schools traveling exhibits illustrating natural history and economic subjects. Also devoted to work with children is the James Nelson and Anna Louise Raymond Foundation for Public School and Children's Lectures, which provides educational motion pictures, lectures, story hours, and other children's entertainments both in the schools and in the Museum itself.

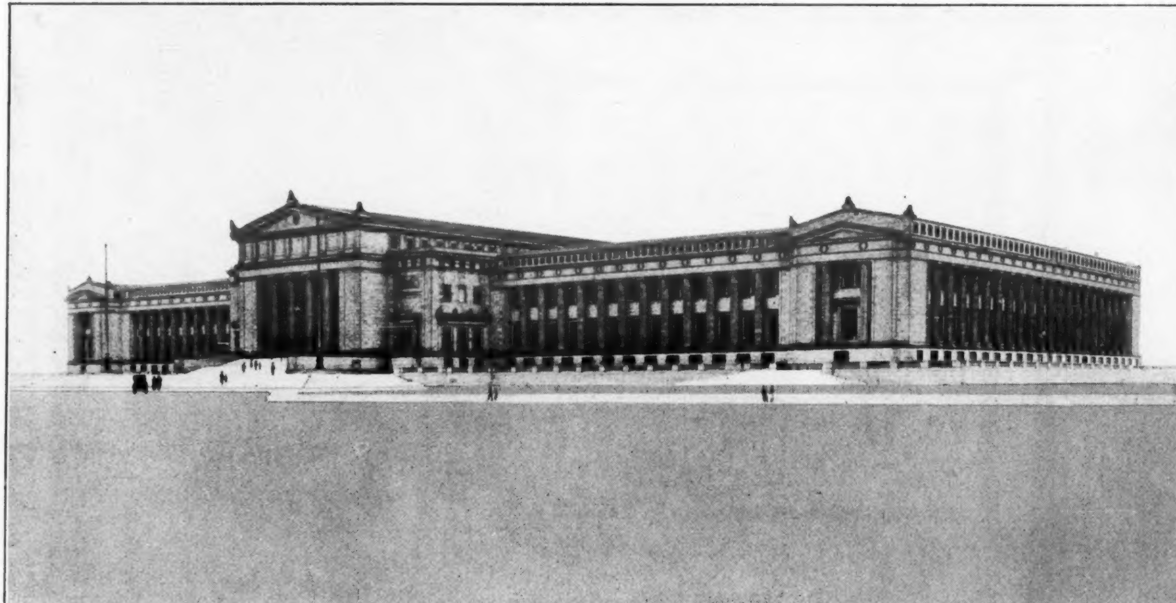
The Museum building is 700 feet long, 350 feet wide, 90 feet high, and with the terrace and grounds surrounding it, occupies an area of about eleven acres. The central hall, Stanley Field Hall, dedicated to the present president of the institution, is 299 feet long and 68 feet wide, and rises to the entire height of the building; the rest of the structure is divided into four floors. Of these the main, second, and a large part of the ground floor are devoted to exhibition purposes; the remaining space serves for the library, printing plant, study rooms, working quarters for the administrative and scientific staffs, and maintenance force. The exterior of the building, which is of white Georgia marble, is treated in monumental manner based on Greek architecture of the Ionic order. In this structure the architects, D. H. Burnham and Company, and Graham, Anderson, Probst and White have given to Chicago and the nation a masterpiece of monumental building possessing distinction and dignity appropriate to its purpose and origin.

Stanley Field Hall is devoted to synotic exhibits which serve as an introduction to the systematic collections in the various departments, and to temporary exhibits brought in from time to time by the Museum's expeditions, of which as many as eighteen are dispatched to various parts of the world in a single year.

The Department of Anthropology contains vast collections illustrating the archaeology and ethnology of Egypt, Etruria, Greece, Rome, Ireland, Eskimos, Indians of North, Central and South America, China, Tibet, Japan, Melanesia, Polynesia, Micronesia, Africa, India, Siberia, Korea, Madagascar, Malaysia, and the Philippines.

The Department of Botany is established on a larger scale than ever previously attempted in a general natural history museum, including halls devoted to plant economics, domestic and foreign woods, a hall of plant life in which the exhibits are designed to furnish a general view of the range of plant life, and a vast herbarium.

The Department of Zoology has several remarkable series of habitat groups of



Courtesy of Field Museum of Natural History.

FIELD MUSEUM OF NATURAL HISTORY, north facade.

Courtesy of Field Museum of Natural History.

IRON METEORITE FROM QUINN CANYON, NEVADA. Weight, 3,275 pounds. Composition, iron 92%, nickel 7%.

mammals and birds, and large collections systematically arranged illustrating the various forms of animal life—of the land, air and sea—found in all parts of the world. As the readers of ROCKS AND MINERALS will be most interested in the Department of Geology, the above inadequate sketch will have to suffice for the other departments.

Six large exhibition halls are devoted to the collections of the Department of Geology, and the Department is equipped with various laboratories where specimens may be prepared for exhibition and where research may be conducted by the scientific staff. The work of the Department is directly in charge of Dr. Oliver C. Farrington, the Curator, who has held that post since the Museum's earliest days.

One hall is devoted to minerals, crystals and meteorites; another to physical geology, rocks and relief maps; the third to petroleum, coal, clays and sands; the fourth to ores, marbles and alkalies; the fifth to fossil animals and plants; and the sixth to gems and jewels.

The vast collection of minerals is arranged systematically, beginning with the native elements, and progressing through mineral sulphides, haloids, oxides, carbonates, silicates, phosphates, etc., in order, the series ending with the hydrocarbons. Minerals such as realgar, proustite, etc., which fade or change color on exposure to light, are covered by boxes which can be raised for inspection of the specimens by pressing a button on the outside of exhibition case. Five large cases are devoted to quartz and its varieties and three to calcite. A special case is devoted to specimens illustrating agate and its characteristic features. Various species of mica occupy another case. A large collection of pseudomorphic minerals is shown. There is also an exhibit of radiographs made by different species of radio-active minerals.

The Museum possesses the famous William J. Chalmers Crystal Collection. This collection illustrates, by means of carefully selected mineral specimens, the systems according to which minerals crystallize, and the varying development of crystal form in each system. Several types of twin crystals and other crystal groupings are illustrated, as well as various features of crystal growth such as zone structure, inclusions and phantoms. Many of the crystals are of gem quality

Courtesy of Field Museum of Natural History.

CRYSTAL OF TOPAZ FROM MARAMBAIA, BRAZIL. Weight, 99½ pounds. The front surface is a cleavage plane, the other surfaces are crystal faces.

and would have been cut for gems but for their preservation in this collection. The series of tourmalines is especially remarkable for the variety of colors and forms shown. A case of amber and one of ornamental minerals supplement the mineral collection.

Thirteen cases are devoted to exhibition of one of the largest collections of meteorites in the world—in fact, the largest as regards number of falls represented. More than two-thirds of all known meteorite falls are represented by specimens in this collection. Some are in the form of polished or etched slabs which display the interior structure. Others are unbroken and show how meteorites appeared when picked up immediately after their fall. The largest specimen weighs 3,336 pounds. More than two tons of meteorites from the famous locality at Canyon Diablo, Arizona, including one weighing 1,013 pounds, are shown. The Paragould meteorite, weighing 745 pounds, which is the largest single meteoric stone ever actually seen to fall, is displayed. Etched faces on many of the iron meteorites illustrate the peculiar figures which distinguish these meteorites from terrestrial iron.

A section of the Department is devoted to illustrating physical geology, including specimens illustrating such phases as wear or erosion of rock by ice, wind and water; a great variety of forms of concretions; and such important groups as volcanic products, dendrites, tufas, veins and vein structures, faults, folds, joints and cave formations. A gypsum cave, reconstructed with large gypsum crystals obtained in the original cave in Utah, is on exhibition. Other interesting features are fulgurites or "lightning tubes" formed by lightning striking sand and rock; a systematic collection of rocks consisting of about 300 specimens of uniform size of all the important rock types; a model of the famous Natural Bridge of Virginia; a collection of relief maps showing topography of selected portions of the earth's surface; and a model of the moon, 19 feet in diameter, the largest and most elaborate representation of that satellite's surface ever made.

Remarkably complete collections of petroleums, coals, clays and sands; and ores, marbles and alkalies, are exhibited. Interspersed among these exhibits are such features as a model of an oil well, a model of the original Rockefeller refinery, and models of a brick yard, cement plant, various kinds of mines, and blast furnaces.

Courtesy of Field Museum of Natural History.

SLAB OF FOSSIL FREE-SWIMMING CRINOIDS (*Uintacrinus*), Logan County, Kansas. Size of slab, 4½ feet by 8 feet. About 200 individuals can be seen.

In Ernest R. Graham Hall of Historical Geology a vast collection of fossils, and reproductions of fossil creatures as scientists believe they must have appeared in life, is shown. These cover the ages from the beginnings of the simplest forms of life, estimated at one and one-half billion (1,500,000,000) years ago down to the time of prehistoric men.

In the collection of gems and jewels are shown examples of nearly every gem in both cut and uncut specimens. A number of specimens of historic interest and high intrinsic value are included, among them the DeVrees engraved diamond, the Hope, Tiffany and Crane aquamarines, the Russian topazes, and the Sun God opal. Among exceptionally large specimens are a sapphire weighing 99½ carats, a cut aquamarine weighing 341 carats, and a topaz weighing 90 pounds.

The Mineralogy Club of the Northeast High School of Philadelphia, Pa., sponsored by Mr. E. H. Cienkowski of the Science Department of the high school, has just completed a most successful year. The members of the club, some thirty enthusiastic and ardent mineralogists, got off to a good start last fall when Mr. Cienkowski discovered a new locality of vein quartz near Bridgeport, Pa. Many beautiful and large groups of quartz crystals were carried away by the boys. One specimen easily measured a foot and a half square. This was displayed at a meeting of the Philadelphia Mineralogical Society and aroused much favorable comment.

With the approach of Thanksgiving a trip to the famous trap locality at Paterson, N. J., was planned and several boys responded most eagerly. This trip will long be remembered as one of the coldest trips the club had ever taken. With the thermometer hovering in the tens, the boys bravely faced the cold and between repeated freezings and thawings at a fire, crudely made in the quarry, they succeeded in getting many of the beautiful specimens which makes Paterson a mecca for all mineralogists.

During the Easter vacation, the annual pilgrimage to Ward's Natural Science Establishment at Rochester, N. Y., was taken and the boys marvelled at the many beautiful minerals which the Establishment is obtaining from all parts of the world for its patrons. The beautiful and exquisite specimens of Apatite from Durango, Mexico; the Vanadinites from the old Yuma mine, near Tuscon, Ariz., the Pyrites from Elba, etc., all served to engender an interest in mineralogy such as nothing else could do. The minerals were there, thousands of them, for the boys to look at, to cross-examine, to gloat over, and not locked behind glass doors as one is accustomed to seeing them in museums.

From Rochester the party moved on to Herkimer County, N. Y., where in the vicinity of Little Falls, Middleville, Salisbury, and Newport, many hundreds of the beautiful quartz crystals, sometimes called Herkimer or Little Falls "Diamonds", were found in a calciferous sand rock.

The last but not least event of the year was the mineral contest and exhibition held last May at the school itself. Many hundreds of people attended the exhibition and all agreed that it was a most gorgeous affair. Many prizes were awarded by the Philadelphia Mineralogical Society to the boys for the following exhibits: (1) Most showy collection irrespective of how obtained—all minerals must be personal property of exhibitors; (2) best suite of a certain mineral, such as calcite, barite, quartz, etc.; (3) best collection of local minerals; (4) collection showing most unique specimen or specimens; (5) best labelled collection; (6) best collection of minerals showing crystal forms—all systems of crystallization to be included; (7) best collection of minerals showing the physical properties of minerals; and finally a special prize or prizes to that boy or boys who are able to identify the most minerals in a mineral guessing contest arranged by Mr. Cienkowski.

Idar---The Home of the Precious Stone Industry

—— By ——

George O. Wild

Instit. f. Edelstein-forschung, Idar, Germany*

The central market place for the whole world for semi-precious stones, the town of Idar, is situated in Germany between the Rhine and the French border, on a little river called "Nahe". The traveler who enters Germany from Paris, via the old fortress of Metz and the Saare district proceeding to Frankford on the Main, passes the town of Idar which is an express stop. (The name of the station is Oberstein-Idar). The distance from Paris is about nine hours while the Rhine River is about two hours away. Another hour of travel along the romantic borders of this river brings one to Coblenz, the center of Occupation at the time of the American Army's stay in Germany.

Idar is a very old town and it existed at the time of the Romans. With a present population of 8,000 souls, it is the center of an industrial district deriving its income chiefly from the cutting of semi-precious stones. For hundreds of years the brooks emptying their waters into the Nahe river have been lined with numerous water-driven cutting mills wherein all sorts of stones are wrought into fancy shapes for the adornment of almost the entire world.

Most of the material used in cutting was formerly mined in nearby quarries but when the new world was thrown open and people from this district migrated to North and South America, there were discovered new deposits of stone and soon

One of the Water-Driven Mills in the Nahe Valley

they began supplying their relatives at home with better and more varied material with which the present important industry was developed. Agates were found in Brazil, better and larger than those of the home quarries and enterprising young men began leaving the home districts on prospecting trips to foreign countries. The fruit of these adventures were the discovery of the Amethyst, Topaz and Aquamarine mines in Brazil. At the close of the last Century one could find representatives of the Idar District in almost all known Precious and Semi-precious stone mining centers of the world, in Australia (Sapphires, Opals); in Madagascar (Beryls, Tourmalines, Garnets, etc.); and in Columbia (Emeralds); a. s. o. At the present time, men from Idar are scattered all over the world doing either lapidary work or acting as traders for either rough materials produced by foreign countries or selling the finished products to these same countries supplying them with the primary material. There is hardly any stone mine around which are not centered some offspring from this district and there is no large city in the United States which does not house one or more lapidaries from Idar.

Modern times have wrought many changes into the cutting methods. The water power yielded to electricity and now only a few of the rustic mills survive. They still serve the Agate cutter who does the heavy cutting work on ash trays, balls, beads, knife handles, dentist's spatulas, chemist's mortars, bearing for water meters and scales, etc., but the more delicate faceting work is now done in modern factories.

BANDED AGATE

AN EYE AGATE

The discovery of diamonds in the sands of the former German colony of South West Africa brought the diamond cutting industry into town and now these factories, which employ hundreds of workmen, supply small diamonds to the Holland markets. The advent of the synthetic stones developed a new branch of the industry and the cutting of these is a livelihood to hundreds of workmen and an important factor in the economic life of the district. Practically all of the synthetic stones used by the world's jewelers are cut here.

Anyone interested in precious stones will find it worth-while to visit this little town when touring Europe, especially as it is situated on one of the main railway lines from France to Germany.

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*Institute for Precious Stone Research.

The Gem Department

Conducted by

GILBERT HART

Each issue Mr. Hart will give in this department information concerning gems and gem minerals. As Mr. Hart invites correspondence relating to the department, letters should be addressed to him as follows: Gilbert Hart, St. Edwards University, Austin, Texas.

TOPAZ

Topaz is the scientific name for a rather rare mineral which is often used as a gem. The jeweler's topaz is, however, usually a yellow quartz while true topaz is often called Brazilian Topaz. Both terms are freely applied by the trade to other yellow stones; but this article will deal only with the mineral topaz which is the most popular of such yellow gems.

The name topaz dates from the time of ancient Greece, when it was applied to gems from an island, Tapazios, in the Red Sea. These were yellow peridots; and with changes of language the topaz name has continued in association with the yellow color until applied to the specific mineral by de Boot and Wallerius in the 17th and 18th centuries.

Topaz crystallizes in the orthorhombic system and usually in long prisms of four sides. These may be set almost at right angles to each other, forming nearly a square prism; or may be at 56° and 124°, giving a lozenge-shaped section. This latter prism with the sharp corners truncated by a small face of the first is very typical of topaz. The prism faces are often rough by fine hair-like markings which are parallel to the long edges of the face; and corners are often rounded by many subordinate faces. The ends of the prism may be simple flat bases or more commonly a very complex arrangement of pyramids; over 100 different pyramids have been observed.

Typical gem topaz is yellow with bright sherry as the favorite hue. Colorless topaz is most common in nature, but it has little vogue in jewelry because quartz crystal is of equal beauty and far less expensive to find and cut. Pink, rose, blue and greenish topazes are more rare, and often are used in imitation of the corundum gems.

Artificial alteration of color are common, as in many other gems. The yellow brown topaz of Brazil can be carefully heated, changing the color to a delicate rose which is permanent and not affected by the ordinary events of use. Other yellow stones are bleached by sunlight, while with some, heat treatment merely removes all color.

The great hardness of topaz has given it the place of type mineral for H=8. Very few minerals are harder; it cuts quartz and tourmaline easily. It is, however very brittle, and has an unusually perfect cleavage. Even a slight knock against some solid material will cause a gem to split along the cleavage; and flaking along the girdle of a ringstone is common. In use the topaz is very durable since its hardness resists all common abrasives, and its high polish is retained indefinitely; but with just a trace of accident a beautiful stone may be completely destroyed by the ease with which flaws develop. In specific gravity topaz at 3.55 ranks close to the diamond. It is 30% heavier than quartz, and is easily distinguished by this test from the other common yellow gems, beryl, tourmaline and peridot which are lighter, and corundum and garnet which are heavier.

Topaz is doubly refracting, and yields two distinct colors when viewed in the dichroscope. Specimens which have been heated to alter their color are more dichroic than others. This character is usually sufficient to distinguish topaz from beryl, and when coupled with a measurement of the refractive index identifies topaz amongst most gems. The

index is about 1.63 with spacings of .01 between the two lines of the refractometer. This value is unusually low when compared with the specific gravity, and determination of these two physical constants is usually sufficient to distinguish topaz from all minerals.

Chemically, topaz is a silicate of aluminum which contains a large amount of flourine. The latter element is rather rare in nature and of limited association, so that in general the occurrences of topaz are with acidic rocks of the granite type. It rarely is found in stream gravels as its good cleavage causes crystals to break in thin flakes when subjected to water transportation. A peculiarly interesting occurrence is in lithophyse of rhyolitic lavas, among the minerals deposited from gases and solutions of the lavas in blow holes and cavities of the hot rock. Such pockets are known in several localities in Colorado and Utah. Related genetically to these are the topazes of pegmatites, which are deposited in veins by gases and solutions from large masses of molten rock which have been poured out on the surface as lavas. Many of our New England pegmatites contain this mineral as at Stoneham, Maine; Middletown, Conn.; and Chatham, N. H. Similar localities for pegmatitic topaz are in the southern Appalachains, in many places through the Rocky Mountains, in eastern Brazil, central Europe, and the northern British Isles. The most famous gem topazes come from Brazil or the Ural Mountains. Ceylon also produces gems of this mineral.

Many names are applied to the different topaz gems, usually a locality name coupled with the species, as Colorado Topaz or Saxon Topaz. Slave's Diamond indicates the low value of the white variety. Drop-of-Water refers to water-clear, colorless stones, especially from Brazil. Rose Topaz is also known as Rubicelle, a common term for pink gems. The green kinds are sold as inferior aquamarine under the title "Brazilian Aquamarine" or "Aquamarine Topaz." Siberian and Tauridian Topaz are pale blue; Colorado, Saxon, Indian and Schnecken Topaz are of various yellow shades. The most valuable topaz gem is the bright blue Royal Topaz whose color rivals the sapphire.

Comment and Criticism

To the Editor of "R. & M.":

I am in receipt of the notice of expiration of my membership in the Rocks and Minerals Association, as well as enclosure of three subscription slips.

I am enclosing $1 to pay for my dues for another year, and I have selected three names of natural science teachers in the grade schools of Washington to each of whom I have mailed a slip with a note of praise for the magazine ROCKS AND MINERALS. I hope that each one will become a subscriber. If you will send me a half-dozen more slips, I will remail them to others here in the same way.

I have been with you from the beginning of your undertaking and have seen the magazine grow better and better from year to year, and I value it now more than I do any other one I take; which is saying a good deal, for I belong to three scientific societies which send out magazines.

Being now retired, I have more time to devote to my favorite study, that of mineralogy and geology; and I hope that your subscription list will be raised to 5000 this summer. I would gladly pay $1.50 for ROCKS AND MINERALS, if it was made a bi-monthly even, rather than see it fail to advance in its march as a popular scientific journal of geology and mineralogy, for it is certainly filling a *long-felt want* in a splendid manner up to date.

ELRA C. PALMER,
Washington, D. C.

Little Journeys

By

ALBERT C. BATES
Newark, N. J.

This is the continuation of an interest ing series of articles on dealers and collectors that flourished forty years ago.—The Editor.

These *Little Journeys*, conceived in a reminiscent mood, may be concluded and brought up to date by visits to some of those who advertise in this magazine. It may be presuming on good nature for me to appear to assume that the reader has not himself already made a visit to many of these good people; but I am not so assuming. As I am no longer a buyer of mineral specimens, my approach has been from an angle of sheer friendliness. And so I may help all concerned by giving here the impression these contacts have made on me.

First, a word about the advertisements themselves. Have you noticed how modest is the wording of all of them? How content the dealers have been to state simply what they have to offer. Such methods should impress the thoughtful, and persons intelligent enough to ride a hobby should be thoughtful—for fear of a fall.

So then, let us make a visit to Ward's Natural Science Establishment at Rochester, N. Y. It may be properly called the leading concern in this country, at least, dealing in natural science products. It is very progressive and alert in securing the materials it offers for sale. It employs the Dean of the profession to travel to the mineral localities of the world to select and buy samples, to ship them home, and to return in due time to prepare, label and price each item for exhibition. On his recent trip around the world, Mr. English secured material that exceeded $100,000 in selling value. This concern enjoys the confidence of the scientific and collecting world.

The ads of The Gem Shop, Wolf Creek, Montana, have been models of good taste and seem to me to carry all that can be put into them; as confidence in the merit of what they have to offer, trusting in the good will of prospective customers by offering goods on approval and at modest prices. A recent deal with them and some correspondence show me that collectors may find in The Gem Shop many items at moderate cost that will surely enhance the beauty of their cabinets. The opals they have in stock, judged by samples I have seen, and the fair prices put upon them, warrant my advising anyone desiring a suite, to give references (though not asked by this concern) and ask for an approval parcel.

Speaking of modesty, how often have you read an advertisement that begins—"Dear Friends, I thank you one and all, etc." But my friend of 40 years, Mr. John A. Grenzig of Brooklyn, N. Y., is as original as he is kindly as is manifested in his penning of an advertisement and his dealing with his customers. He has been both an extensive buyer of fine minerals for his private collection, and to stock his store to meet the wishes of his friends, as a side line to his regular business. And, by the way, there is some advantage in that combination, if good judgment and taste are exercised. Mr. Grenzig is the President of the Newark Mineralogical Society, with a membership of more than 80 collectors to call to order. I have never known any other collector to show so unabated enthusiasm in this field. It may please Mrs. H. C. Dake of Portland, Oregon, to be advised that Mr. and Mrs. Grenzig are as one in this little matter. Once speaking to Mr. Grenzig about the cost of fine specimens, he said: "Pshaw! hang the cost! I've had and am still having fun with my collection."

Regarding the cost of any rare thing, I am reminded of a saying of Oscar Wilde: "A cynic is a man who knows the price of everything and the value of nothing."

Mr. Expositor, expert lapidary of New York City, will not remember me but I first knew him as an apprentice many

years ago with Graham & Co., on Nassau street. He with his brother (deceased) issued not many years ago a pretty littel brochure on gems, giving a list and meaning of birthday stones, and it is just possible if he has any on hand that on request he will mail you a copy—if you will supply a postage stamp.

A word to mineralogists who may be going to visit Maine. Do not fail to include a visit to the Oxford County localities. At Buckfield, call on Howard M. Irish and obtain permission to go to Mt. Mica—which mine is being worked this season by him. And speaking of this locality, get from your library a copy of Saxe Holm's and read the story of "My Tourmaline."

And so ends the Little Journeys. But really who can say as to that? Ideas spring into being and a pen gets into one's hand and the ink flows. The kind of trail it leaves may be of doubtful value—but who cares? Get what you can out of the printed word and let it go at that. Truth may not reside in every conclusion but sincerity can.

THE ROCKS AND MINERALS ASSOCIATION

PEEKSKILL, N. Y., U. S. A.

Organized to stimulate public interest in geology and mineralogy and to endeavor to have courses in these subjects introduced in the curricula of the public school systems; to revive a general interest in minerals and mineral collecting; to instruct beginners as to how a collection can be made and cared for; to keep an accurate and permanent record of all mineral localities and minerals found there and to print same for distribution; to encourage the search for new minerals that have not as yet been discovered; and to endeavor to secure the practical conservation of mineral localities and unusual rock formations.

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A Compilation of Gem Names

By

GILBERT HART

St. Edwards University, Austin, Texas

Mr. Hart and ROCKS AND MINERALS will be glad to have readers send in additional gem stone names not here included or suggestions as to any corrections in names which they believe should be made.

This is a continuation of the very interesting compilation of gem names (the largest ever printed) made by Mr. Hart, the first installment of which appeared in the December, 1927, issue of the magazine. This list will be continued until completed.—The Editor.

Pyrophyllite—compact to foliated micaceous mineral; color pale green; hardness 1 to 2; specific gravity 2.85; hydrous silicate of aluminum; also called **Agalmatolite.**

Pyroxene—a group of silicate minerals with the bases iron and aluminum, calcium and magnesium. Symmetry orthorhombic, monoclinic or triclinic. Following are used as gems: **Diallage, Diopside, Enstatite, Hypersthene, Jadeite, Pectolite, Rhodonite, Spodumene, Wollastonite.**

Quartz—hexagonal, usually in prisms, also massive or cryptocrystalline; color varies greatly according to pigmenting material; hardness 7; specific gravity 2.5 to 2.8; oxide of silicon; gem names: there are over 3000 different gem names used for quartzes, which are indexed in the following classification: **Rock Crystal,** pure, clear, colorless quartz; colored quartzes, see below; **Segenite,** clear quartz with inclusions; **Chalcedony,** cryptocrystalline silica, optically different from quartz, but chemically identical; **Jasper,** fibrous quartz, often almost cryptocrystalline; other varieties, see below; colored quartzes: **Amethyst, Amethystine Quartz, Ancona Ruby, Apricotine, Arizona Ruby, Azure Quartz, Bishop's Stone, Blue Quartz, Bohemian Ruby, Bohemian Topaz, Brazilian Topaz, Burnt Amethyst, Burnt Stone, Cairngorm, Cairngorm Stone, Cairngorum, Citrine, Citrine Quartz, Colorado Topaz, False Topaz, Golden Topaz, Greasy Quartz, Indian Topaz, Lavendine, Maderia Topaz, Milk Topaz, Milky Quartz, Mont Blanc Ruby, Occidental Amethyst, Occidental Topaz, Orange Topaz, Oriental Amethyst, Rose Quartz, Rubasse, Sappharine, Sapphire Quartz, Sapphirine, Saxon Topaz, Schnecken Topaz, Scotch Pebble, Scotch Topaz, Siberian Amethyst, Siderite, Smoke Stone, Smoky Quartz, Smoky Topaz, Soldier's Stone, Spanish Topaz, Yellow Quartz.** Gem names for unusual crystals and pseudomorphs: **Babbel Quartz, Beckite, Beekite, Cavernous Quartz, Cotterite, Drusy Quartz, Eldoradorite, Fossil Coral, Ghost Quartz, Hydrolite, Iridescent Quartz, Iris, Mineral Blossom, Orbicular Silica, Petrified Honeycomb, Petrified Wood, Phantom Quartz, Rainbow Quartz, Scepter Quartz, Silex, Silicified Wood, Sinter, Wood Stone.**

Quebec Diamond—quartz, rock-crystal.

Quinzite—opal, common opal, rose colored.

Radio Opal—opal, smoky brown color, due to organic inclusions.

Radiumite—mixture of yellow uranotile, black pitchblende, and orange gummite.

Rainbow Agate—quartz, agate which shows iridescence when cut across its concentric structure.

Rainbow Chalcedony—chalcedony in thin concentric layers which yield irridescence when cut across.

Rainbow Quartz—quartz, iridescent.

Rain Stone—quartz, rock crystal in water-worn pebbles.

Rattle Box—limonite geodes from Chester Co., Pa.

Realgar—monoclinic, massive; red to orange; hardness 1.5 to 2; specific gravity 3.56; sulphide of arsenic.

Reconstructed Gem—an artificial stone made by fusing or recrystallizing fragments of natural gems.

Red Stone—corundum, ruby.

Resin Opal—opal, with resinous luster.

Retinalite—serpentine, honey yellow with resinous luster.

Rhaetizite—kyanite, white, from the Tyrol.

Rhinestone—quartz, rock crystal.

Rhodochrosite—hexagonal; usually massive; various shades of pink; hardness; specific gravity 3.55; carbonate of manganese.

Rhodolite—rose colored garnet between pyrope and almandite.

Rhodonite—member of the pyroxene group of silicates; monoclinic; massive; red; hardness 6 to 6.5; specific gravity 3.63; silicate of manganese; also called **Fowlerite.**

Rhyacolite—otrhoclase, greasy crystals.

Riband Agate—quartz, agate in wide parallel bands.

Riband Jasper—quartz, jasper in differently colored alternating bands.

Ribbon Agate—quartz, banded agate.

Ricolite—verde antique, banded.

Ring Agate—quartz, agate with concentric circular bands.

Ripe Diamond—diamond, compare with unripe diamond.

River Agate—quartz, moss agate pebbles from stream beds.

River Sapphire—corundum, light colored sapphire.

Rock Crystal—quartz, clear, colorless, and transparent. The following names have been applied to rock-crystals: **Alaska Diamond, Alencon Diamond, Arkansas Diamond, Baffa Diamond, Bohemian Diamond, Brazil Diamond, Brazilian Diamond, Brazilian Pebble, Briancon Diamond, Bristol Diamond, Bristol Stone, Buxton Diamond, Cape May Diamond, Catalinite, Catalina Sardonyx, Coradgee Stone, Cornish Diamond, Crystal, Dauphine Diamond, Dragonite, Dragon's Eye, False Diamond, Fleurus Diamond, Herkimer Diamond, Horatio Diamond, Irish Diamond, Lake George Diamond, Marmorosch Diamond, Mora Diamond, Mountain Crystal, Occidental Diamond, Paphos Diamond, Pebble, Pecos Diamond, Pseudodiamond, Quebec Diamond, Rain Stone, Rhine Stone, Rock Quartz, Schaumberg Diamond, Trenton Diamond, Unripe Diamond, Vallum Diamond, Vellum Stone, White Sapphire, White Topaz, Wicklow Diamond.**

Rock Quartz—quartz, rock crystal.

Rock Ruby—pyrope, red.

Rock Turquoise—turquoise matrix, with small embedded grains of turquoise

Rocky Mountain Ruby—pyrope.

Romanzovite—grossularite, brown.

Rosaline—zoisite, thulite.

Rose Fluor—fluorite, pink octahedra.

Rose Quartz—quartz, rose-red to pink, invariably massive.

Rose Topaz—topaz, pink.

Roselite—garnet, pink, usually pyrope.

Rosterite—beryl, rose-red, from Elba.

Rothoffite—andradite, yellow-to liver-brown.

Royal Topaz—topaz, blue.

Rubasse—quartz artificially stained red.

Rubellite—tourmaline, pink to red.

Rubicelle—spinel, yellow to orange-red.

Rubin Etoile—corundum, French term for star-ruby, used to some extent by English speaking jewelers.

Rubino-di-rocca—garnet, red with tinge of violet.

Rubolite—opal, red, from Texas.

Ruby—corundum, red, transparent, most desired tint is "pigeon blood."

Ruby Copper—cuprite, bright red, transparent.

Ruby Matrix—smaragdite, with inclusions of corundum, from N. Carolina.

Ruby Spinel—spinel, deep red.

Ruby Tin—cassiterite, red.

Ruin Agate—quartz, agate, bands in parallel layers brecciated to resemble ruins.

Ruin Aragonite—aragonite, brecciated Mexican Onyx.

Ruin Jasper—compare ruin agate.

Ruin Marble—calcite, marble which shows irregular zig-zag lines of oxide.

Rutilated Quartz—quartz, sagenitic, with rutile needles, especially when arranged in net-work rather than in parallel fibres.

Rutile—tetragonal; in striated prisms; brown to black; hardness 6; specific gravity 4.2; oxide of titanium. Gem names: **Edisonite, Money Stone, Nigrine.**

The President's Page

By

DR. HENRY C. DAKE

TYPES OF MINERAL COLLECTIONS

In viewing the large mineral collections in the museums and schools, the mineral collector may often wonder just what type of collection would suit his fancy and purpose best. Among other things to be considered are, the purpose of the collection, the available space for housing and the funds available for investment in a collection. Needless to say the big majority of collectors can never hope to secure and maintain a collection of museum proportions.

In a recent advertisement, a well known mineral supply firm asked the opinion of collectors as to the most beautiful mineral in all the world. Without doubt the choice of most collectors would be one of the many marvelous crystallized minerals, and it is this type of mineral most highly prized for display in the cabinet. The diversity of crystallizations seems unlimited, with new forms being found almost daily. Many of the large, well crystallized specimens are rather costly and may require special facilities for displaying and housing. However one can acquire a very good working collection of crystallized minerals in microsopic sizes at a small fraction of the cost of a microscopic one. It is well known that as a rule the smaller the crystal the more perfect it is likely to be. Many collectors have specialized in these microscopic crystal collections, since they have the advantage in low cost and small space required for housing. A crystal collection of this type can be enjoyed by every collector. A low power binocular microscope is all that is needed to view same.

Another very interesting type of mineral collection is that illustrating the many different physical properties. A collection of this kind is very useful for study purpose and is often seen in our museums and educational institutions. The University of Idaho at Moscow has a very excellent collection of this kind. In our museums and schools we also see collections of the economic minerals, in which are included the ores and minerals having a commercial value.

Probably every collector of minerals would like to have a complete set of the many fine gems and semi-gem minerals for his cabinet. Unfortunately fine gem minerals are costly, the larger finer specimens often being valued at a very large figure. Most of the mineral dealers have good gem minerals which due to flaws and other defects renders the material unsuitable for cutting. Much of this type of gem material is excellent for cabinet display and is sold at a much lower figure than the flawless.

The average collector will probably find it best to first acquire a good diversified general collection, with all the groups well represented with both massive and crystallized material. A collection of this type will serve for study and comparative purposes, and can in time be built up with better specimens. The beauty of a mediocre general collection can be greatly enhanced by the presence of one large well crystallized representative in each group. After this basic collection has been made the collector can choose one or more groups to "specialize" in. For this purpose the following groups will be found admirable: quartz, fluorite, silicates, calcite, native elements and the rare element minerals. A small collection of minerals from a particular locality, mining district or part of a state is also of interest, if complete. The possibilities along this line seem unlimited. The late Col. Roebling in his very large collection of over sixteen thousand specimens, had nearly two thousand calcites, all different or from different localities.

Specializing in a certain group or kind of mineral has a peculiar fascination of its own. The writer has for the past few years given special attention to the minerals of the native element group with interesting results.

Membership Department

New Members Enrolled—April 20, 1930—July 25, 1930

THE HONOR ROLL

New Members Secured since January 1st, 1930, by:

The Gem Shop, Wolf Creek, Mont.	29
Ward's Natural Science Est., Rochester, N. Y.	24
Noyes B. Livingston, Fort Worth, Texas	5
Edmund H. Cienkowski, Philadelphia, Penn.	5
John A. Grenzig, Brooklyn, N. Y.	5
William C. McKinley, Peoria, Ill.	5

ALABAMA

Troy—McNeal, William

ALASKA

Fairbanks—Johnson, Sidney

ARIZONA

Bolado—McGowan, Chas.

CALIFORNIA

Claremont—Colcord, R. M.
Gaylord, G. B.
Woodford, Dr. A. O.
Deep Springs—Suhr, O. B.
Eureka—Johnston, Chester.
Los Angeles—Houghton, Carl.
Ogilby—Shippy, N. D.
Redondo Beach—Vanderford, G. C.
San Francisco—Strickler, Letus S.
Whittier—Smith, Elliott C.

CONNECTICUT

Meriden—Hogan, E. P.
Martin, Russell

HAWAII

Schofield Barracks—Holst, John H.

ILLINOIS

Chicago—Hanke, Dr. Milton T.
Rassweiler, August
Lemont—Piecarski, Frank E.
Roberts—Arnold, Seward
Rockford—Howe, Charles H.
Sterling—McGarrah, W. W.

KANSAS

Harper—Wagner, Gus
Medicine Lodge—Warwick, Thomas

MAINE

Bethel—Thurston, H. D.
Freeport—Lieberman, Joshua
Paris—Valley, Arthur J.
West Paris—Public Library

MARYLAND

Baltimore—Enoch Pratt Free Library
Westminster—Schaeffer, Prof. Carl L.

MASSACHUSETTS

Conway—Koeber, Mrs. Clara T.
Fall River—Rev. Mother Marie Helena
Lawrence—Bucklitch, G. J.
Freeman, Martin
Methuen—Wadsworth, John H.
Northampton—Paige, Miss Ethel
Uxbridge—Alton, G. Gilbert

MICHIGAN

Detroit—Freese, John Andrew
Sternfels, H. M.
Houghton—Evens, Howard G.

MINNESOTA

Minneapolis—Sherwin, Mrs. M. K.

MISSOURI

Joplin—Barton, J. C.
Buskett, Evans W.

NEBRASKA

South Omaha—Charnot, Frank

NEVADA

Goldfield—Giles, E. S.
Ruby Valley—Short, Jesse M.

NEW JERSEY

Bloomingdale—Donald, William
Chatham—Dawson, Frank
Dover—Berry, Kenneth C.
Jersey City—Ohlssen, Miss Dorothy
Merchantville—Mason, Arthur E.
Montclair—Tripett, Harry
Ogdensburg—Chorney, Paul
Paterson—Ekings, R. M.
Morrill, Miss Louise
Seaman, Herbert G.
Roselle Park—Miller, George H.

NEW YORK

Albany—Peck, Harry S.
Ballston Lake—Sanders, John A.
Brooklyn—Burke, Joseph F.
Schiercke, Theodore H.
Sheaff, Howard
Sheridan, John M.
New York—Dreher Bros. & Wider
Gunagan, Richard H.
Hansen, Miss Peggy N.
Strong, H. T.
Vlismas, John
Port Chester—Hartnett, Wm.
Syracuse—Lyon, Emory J.
West Bronx—Houser, Ardon F.

NORTH CAROLINA

Morganton—Palton, George

OHIO

Akron—Dice, Miss Eleanor
Bedford—Molder, Miss Helen Jane
Cleveland—Sensel, Eugene
Cleveland Heights—Dietz, David

OKLAHOMA

Oklahoma City—Sanders, Jr., C. W.

OREGON

Portland—Brogan, Joseph
DeVore, Miss Virginia

PENNSYLVANIA

Bethlehem—Bieber, Robert A.
Germantown—Brown, Miss Esther
Harrisburg—Rothrock, Boyd P.
Philadelphia—Bauer, Gustav
Buseman, John
Day, Robert
Dornblum, Arthur
Gordon, Dr. Samuel G.
Klein, Albert
Waage, Karl M.
West Elizabeth—Bucy, Miss Gladys L.

SOUTH CAROLINA

Greenville—Guerry Jr., DuPont
Huntington, R. S.
Rock Hill—Rice, Miss Phyllis

SOUTH DAKOTA

Keystone—Cessna, Jas. A.
Lead—Driskill, William C.

TENNESSEE

Clarkrange—Davidson, Mrs. Hettie
Madison—Robinson, Miss Mable

TEXAS

Houston—Stiles, W. E.
Paducah—Drummond, Claud E.

UTAH

Clear Lake—John, E. W.

VIRGINIA

Farmville—Fraser, Dr. A. C.

WASHINGTON

Omak—Laycock, J. R.

WISCONSIN

Milwaukee—Milwaukee Public Museum

Canada

NOVA SCOTIA

Sambro—Crosby, Rev. Thomas C.

Mexico

TAMAULIPAS

Tampico—Bray, Vinton A.

Asia

DUTCH EAST INDIES

Billiton—Chung, N. C.

Many collectors have been inquiring about the disposal of the collection of the late Loren B. Merrill, operator for many years of the famous quarries at Mounts Mica, Rubellite and others. The complete collection has been willed to his son-in-law, Arthur J. Valley, who will continue the work of collecting and cutting Maine minerals.

ROCKS AND MINERALS would be pleased to receive donations of photos of minerals, mineral localities, geological formations, and others. Such as we can use we shall be glad to print in the magazine.